

## ACTIVITY 8: Deformation - make your own folds and faults

(seconds [faulting] to millions of years [folding, faulting, metamorphism during mountain building])

### Topic addressed:

To show how folded and faulted rocks at outcrop can provide evidence of the size and direction of the forces which produced the deformation.

### Resource list:

- Transparent plastic box (e.g. chocolate box or component drawer)
- Spatula or dessertspoon
- Tray
- A piece of board to fit snugly into the box
- 500g of dry fine sand
- 25g of flour

### Pupil learning outcomes:

Rocks frequently become fractured during their history, but school laboratory investigations on real rocks are difficult to carry out with any finesse. The activity described uses layers of fine sand and flour which behave like layers of rock.

Pupils should appreciate that faulted rocks at the Earth's surface contain clues about the ancient pressures which deformed them.

The near-horizontal faults produced by compressional pressures are called thrust faults (more steeply inclined faults are produced by tensional stresses and these can be formed in the same transparent box as in Activity 8, by putting the vertical board in the centre of the box, filling one side with sand and flour as before and moving the board gently away).

Large scale pressures acting within the lithosphere are caused by plate tectonic movements. Where plates are converging, the compressional stresses produce near horizontal thrust faulting. Where plates diverge, the tensional stresses produce steeper faults, called normal faults.

### Learning objective:

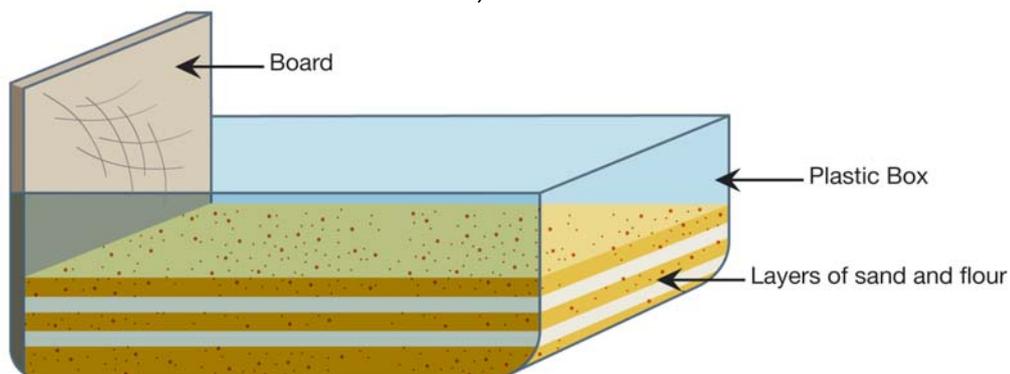
To simulate the movements which produce faulting in rock structures.

### Activity:

When pressures are applied to solid materials they may bend or break. When sands or sandstones bend, folds are produced; when they break, faults are formed.

Find out what types of folds and faults are produced by compression by following these instructions.

- Place the board vertically inside one end of the box.
- Build up several thin layers of flour and sand. Do not fill it more than half-full. (Only thin layers of flour are needed, sprinkled along the front of the box alone, in order to save flour and to allow the materials to be reused several times.)



- Very carefully, push the vertical board across the box, so that it begins to compress the layers. When you notice the layers beginning to bend, stop pushing the board. Hold the board upright and draw a scaled diagram of the result.
- Continue pushing the layers with the board until the sand is about to overflow the box. Hold the board upright and draw a scaled diagram of the result.

### [View Animation](#)

- Then add arrows to your diagram to show the directions of the forces which were acting whilst you compressed the layers with the board.
- Are the layers still horizontal, or are they folded?
- Did one set of layers slide over the rest? If you have been careful, you will have produced a fault in which layers of rock are pushed up and over other layers. These types of faults are often nearly horizontal.
- How could you use the same apparatus to find out what happens when sands and sandstones are stretched (put under tension)?

### **Source:**

This activity is based on ESTA's "Earth's Surface Features" in "The Science of the Earth 11-14" series.